STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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REGISTERED MAIL

February 8, 2008

Mr. Whit Anderson
Director of Programs
Northwestern Division
U.S. Army Corps of Engineers
P.O. Box 2870
Portland, OR 97208

Dear Mr. Anderson:

The U.S., Army Corps of Engineers (Corps) requested an adjustment of the Total Dissolved Gas (TDG) criteria at Corps dams on the Columbia and Snake Rivers in Washington to aid fish passage over hydroelectric dams. The Department of Ecology's (Ecology) approval of gas abatement plans is required under Washington State's water quality standards WAC 173-200(i)(f) in order to apply the adjusted TDG standards to the Columbia and Snake Rivers. Implementing the conditions in this approval constitutes a large part of the implementation by the Corps of Washington's Lower Columbia River TDG Total Maximum Daily Load (TMDL), Mid Columbia River TDG TMDL, and Snake River TDG TMDL.

The Corps submitted a gas abatement plan (*Water Quality Plan for Total Dissolved Gas and Water Temperature in the Mainstem Columbia and Snake Rivers, December 2006)* to Ecology. Subsequently, Ecology requested further information showing how water quality standards can be met for each dam. The Corps provided draft information for John Day, McNary, and Ice Harbor Dams. However, this information was never finalized. No information was provided for the other dams. The Corps also submitted:

- TDG physical monitoring plans.
- Biological monitoring plans.

The Washington State Department of Ecology approves the gas abatement plan based on the following findings:

1. Failure to act will result in more salmonid passage through the hydroelectric dam turbines. Estimated mortality from juvenile salmonids passing through turbines is between ten and

fifteen percent; juvenile salmonid passage mortality over dam spillways is between two to three percent.

2. Exposure to elevated TDG as a result of spill is harmful to fish. However, anadromous salmonids experience less harm when exposed to limited concentrations of TDG than the harm experienced by passing through turbines. A risk analysis was performed by the United States National Oceanographic and Atmospheric Administrations Fisheries in 1996 and updated in 2002. Based on this risk analysis, Ecology's water quality standards allow higher levels of TDG upon approval of gas abatement plans.

3. The Corps is providing structural and operational improvements at all dams.

4. The smolt monitoring stations discovered negligible TDG bubble trauma in juvenile salmonids.

This approval is subject to the following conditions:

1. This approval shall extend through February, 2010 and apply to Corps dams on the Columbia and Snake rivers in Washington State.

2. This approval means that spill may raise the dissolved gas levels above 110 percent saturation to aid fish passage, but not to exceed 125 percent saturation as a one-hour average. Gas saturation may not exceed 120 percent in the tailrace, and 115 percent in the forebay of the next dam downstream as measured at the fixed monitoring stations as an average of the twelve highest consecutive hourly readings in any one day.

3. The 7Q-10 may be recalculated once for each dam during the period of this approval by adding additional years of record. Ecology will review calculations and methodology, and if consistent with previous calculations used in the three TMDLs for TDG in the Columbia and Snake Rivers, approve the new 7Q10 numbers for Washington.

4. The Corps will conduct the following activities:

    a. Investigate and pursue TDG reduction improvements for Bonneville, The Dalles, John Day, McNary, Chief Joseph, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams including a complete analysis of each dam's ability to meet water quality standards for TDG. These activities need to go through the broader analysis of the System Configuration Team. Provide information on each project that includes the following:

Actions investigated to meet	% of time 110% criterion is	Predicted benefit to TDG levels (in	Predicted costs	When funding will be	If action not to be implemented,

110% TDG in the TMDL	met outside the spill season*	%TDG) after improvement during the fish spill season at 115/120/125% TDG*		pursued	provide explanation
Existing					
Action #1					
Action #2,					
Action #3, etc.					

* Several assumptions need to be included in these calculations:
  - During flows at the calculated 7Q10 as described in the TMDLs.
  - Data is measured at tailrace compliance points as defined by the TMDLs.
  - One turbine is down at each dam during high flows.
  - Actual expected flows through each turbine take into account fish passage efficiency and power demand during high flows.
  - General fish spill seasons are April through August.
  - General non-fish spill seasons are September through March.

By October 31, 2008, provide a draft report for Ecology review. A final report that incorporates Ecology's comments is due to Ecology on December 31, 2008. Information from this report shall be incorporated into the Corp's next *Water Quality Plan for Total Dissolved Gas and Water Temperature in the Mainstem Columbia and Snake Rivers*.

b. Investigate and pursue TDG monitoring improvements.

c. Investigate and pursue biological monitoring improvements.

d. Make reasonable attempts to reduce gas entrainment during all flows during the spill season;

e. Plan maintenance schedules and activities as much as possible to minimize TDG production resulting from spill to within water quality standards. Plan turbine outages as much as possible for outside the high flow season when this will not cause more harm to the environment or to the structural integrity of the dam.

f. Notify Ecology within 48 hours of initiation of spring, summer and other spills for fish. The notification may be electronic or written.

g. Provide Ecology with an annual written report by December 31 of each year for the activities outlined in this letter and detailing the following:

- Flow and runoff descriptions for the spill season.
- Spill quantities and duration.
- Quantities of water spilled for fish versus spill for other reasons for each project.
- Data from the physical and biological monitoring programs, including a summary of exceedances for each dam and a description of what was done to correct the exceedance.
- Information showing how Grand Coulee Dam meets the 110 percent criterion through power trades with Chief Joseph Dam. Show quantities of water shifted from Chief Joseph Turbines to Grand Coulee Turbines, gas reduction realized at Grand Coulee, and increased spill at Chief Joseph.

This gas abatement approval does not limit the conditions placed in future permits, orders and certifications issued by this department.

Please contact me at (360) 407-6405 or Chris Maynard of my staff at (360) 407-6484 if you have any questions or comments regarding this approval.

Sincerely,

David C. Peeler
Water Quality Program Manager

CC: Agnes Lut, ODEQ
Bill Tweit, WDFW
Dan Diggs, Assistant Regional Director, Fisheries Resources, USFWS
Columbia River Water Quality Team